

OPERATIONS MANUAL

1953 BLOWDOWN-BARK-BEETLE SURVEY

Portland, Oregon
June 1, 1953

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INTRODUCTION

Purpose of Survey.

During the summer of 1952 a detailed survey was made to determine the quantity and extent of damage resulting from blowdown and Douglas-fir bark-beetle infestation in the Douglas-fir region. It is important that additional survey work be done in 1953 for the purpose of: (1) following the course of the infestation; (2) evaluating developments; and (3) recommending such control actions as appear to be warranted.

Specific Objectives.

1. Detect and evaluate the spread of the epidemic outside of the area surveyed in 1952.
2. Detect and evaluate any significant shifts in intensity of the infestation within the area surveyed in 1952.
3. Determine the additional volume loss due to the epidemic both within and outside of the area surveyed in 1952.
4. Establish a system for determining annually the future losses due to the epidemic.
5. Determine the amount, location and character of any blowdown occurring since the 1952 survey which might affect the future of the infestation.
6. Provide information to aid salvage programs in those areas where it appears to be warranted.

General Plan.

To accomplish these objectives, the following five projects are proposed:

1. Preliminary aerial reconnaissance to determine the extent and nature of the recent blowdown.
2. Aerial mapping survey of bark beetle mortality to date.
3. Establishment of a system of aerial photo plots for the purpose of estimating future beetle loss annually.

4. Ground sampling of 1952-53 blowdown to determine the volume loss.
5. Publication of detailed maps showing bark beetle and blowdown damage, where warranted, for salvage purposes.

PROJECT NO. 1

PRELIMINARY AERIAL RECONNAISSANCE TO DETERMINE THE EXTENT AND NATURE OF THE BLOWDOWN OCCURRING IN THE WINTER OF 1952-53

Objectives.

1. Determine the location of areas where the occurrence of 1952-53 blowdown appears serious enough to substantially affect the future of the bark-beetle infestation or the orientation of salvage programs.
2. Establish a basis for stratifying the ground samples for blowdown volume.

Period of Survey.

April 1 to May 15. Approximately five flying days, to be done as soon as weather permits.

Area to be Surveyed.

Entire Douglas-fir region of Washington and Oregon—all of both these States west of the Cascade crest.

Personnel.

One pilot and two observers.

Training.

No training will be required as only experienced personnel will be used.

Methods and Procedures.

Using a Cessna 170B airplane with pilot and two observers, a broad reconnaissance will be made over the Douglas-fir region. Special attention will be given to areas in which ground reports indicate sizeable amounts of new blowdown. Sufficient attention will be given to areas of recent blowdown to determine whether or not they will be included in Project 5. (Project 5 will result in published salvage maps of areas determined to be sufficiently damaged to justify the project.) One observer

will track the course of the reconnaissance flight on a $\frac{1}{4}$ -inch base map and will map in any areas of blowdown seen within $\frac{1}{2}$ -mile of the flight line.

Results.

The primary result of this project will be the outlining of those areas where the 1952-53 blowdown is observed in sufficient quantities to affect salvage operations. These areas will be set aside to be done during Project 5. The remainder of the areas will be done first under Project 2. This area break-down may also be used to stratify the blowdown field plots under Project 4.

Also during this project, a tentative boundary will be established around the present beetle infestation. This will be useful in deciding what maps to prepare for use in Project 2. As work progresses on Project 2, this boundary will be adjusted where necessary.

PROJECT No. 2 AERIAL MAPPING OF BEETLE MORTALITY TO DATE

Objectives.

1. Detect and evaluate the spread of the epidemic outside of the area surveyed in 1952.
2. Detect and evaluate any significant shifts in intensity of the infestation within the area surveyed in 1952.
3. Determine the volume of beetle loss to date in the present epidemic area.
4. Provide the basis for publishing detailed maps of beetle damage for salvage purposes.

Period of Survey.

May 15 to July 15.

Area to be Surveyed.

The area within western Washington and Oregon where the Douglas-fir beetle appears to be epidemic. Those areas which were determined in Project 1 to have sufficient blowdown to justify mapping for salvage purposes will not be mapped in Project 2, but will be reserved for mapping during Project 5.

Personnel.

Two pilots, four observers and one air controller. The air controller will operate a ground radio station and be in constant contact with the planes when they are airborne.

Training.

None will be needed since all personnel will be experienced from the 1952 survey.

Methods and Procedures.

1. General. Within the area covered by this project, significant amounts of mortality caused by the bark beetle will be mapped in place by aerial reconnaissance. Flight lines will be four miles apart, oriented north-south. There may be occasions in the Cascades when it will be necessary to deviate from these flight lines because of extremely rough topography. Such deviations may be done at the discretion of the crew after properly notifying the air controller of their route. These cardinal flight lines will be predetermined and marked on the best available maps.

The aircraft will fly along these flight lines at an elevation of about 1500 feet above the ground. Two observers will map beetle mortality in place on two-mile strips from opposite sides of the plane. The resulting four-mile strip along each flight line will produce 100-percent coverage over the area of this project. The classes of beetle-killed groups will be based on the total number of trees that have died at the date of mapping. The classes will be mapped in conformance with the standards established for the 1952 survey, as follows:

- a. Heavy. Individual groups of 31 or more beetle-killed trees--designated on the map by the numeral "2".
- b. Moderate. Individual groups of 6 to 30 beetle-killed trees--designated in the map by the numeral "1".
- c. Light. General area in which at least one group of 2 to 5 beetle-killed trees occurs on each 40 acres--designated on the map by a shaded area not less than 160 acres in size.

The mapping will start in the Siskiyou Range of southern Oregon, progressing northward through Oregon and eastward to the Cascade crest. The area in Washington, outside of the 1952 survey area, will be left till last. In this manner the

project will follow the season, thus picking up the maximum number of new fades as the work progresses. Local weather conditions will determine how closely this plan can be followed.

2. Map Preparation. In order to provide adequate base maps for this project the following preparations will need to be accomplished:
 - a. Assembly of 5 copies of each quadrangle map involved in this project. The quadrangles to be mapped will be determined in part by Project 1, and in part by concurrent reconnaissance during Project 2.
 - b. Sufficient side lap and end lap will be added to the maps when necessary for tracking and mapping in order to insure complete coverage.
 - c. Flight lines approximately 4 miles apart will be marked on the maps to insure complete coverage of the area.
 - d. The map scale will vary according to the scale of the quadrangle available. In some instances it will be 1 inch equals 1 mile, and in others it will be $\frac{1}{2}$ inch equals 1 mile. When mapping in the Cascades $\frac{1}{2}$ inch equals 1 mile scale maps (30 minute quads) will be used wherever available.
 - e. The sets of quadrangle maps for each plane crew will be assembled in separate "Jobs" of approximately one-day duration covering about 6 quads per "job." These "jobs" will be arranged in such an order that the "buddy" system of plane-to-plane radio contact can be employed during the period when the two planes are operating.
 - f. Master flight maps will be prepared from sectional aeronautical charts in sufficient quantity to supply the air controller and the Oregon State Board of Aeronautics with copies for their needs.

Results.

1. A generalized map of beetle-kill intensity which can be compared with that made in 1952. It will show, when compared, any changes in the boundary of the infestation and any shifts in intensity within this boundary.
2. If warranted, where new areas of heavy damage appear or significant shifts in intensity occur, the base maps can be used to compile salvage maps similar to those produced by the 1952 survey.

3. Establishment of the new boundary of the epidemic within which photo plots will be located by Project 3.
4. This project will provide a method for estimating the total amount of damage due to the Douglas-fir bark beetle to date by methods similar to those used in the 1952 survey.

PROJECT NO. 3
ESTABLISHMENT OF AERIAL PHOTO BEETLE-TREND PLOTS

This project has three phases: (1) selection of the locations of both the beetle-trend plots and the blowdown field plots; (2) aerial photography in color of the beetle-trend plots; (3) processing of the photography.

Objective.

To establish a system for determining annually the future beetle loss throughout the area of the infestation.

Period of Survey.

1. Plot picking: June 15 - July 1.
2. Photography: July 1 - August 1.
3. Processing: July 1 - August 15.

Area to be Surveyed.

The present area of the Douglas-fir bark-beetle epidemic. The boundary of this area will tentatively be determined during Project 1, and will be further refined as Project 2 progresses.

Personnel.

1. Plot picking: one pilot and one observer.
2. Photography: one pilot and one aerial photographer.
3. Processing: to be contracted.

Training.

The only phase in which it is not certain that there will be trained personnel available is the photographic phase. If possible, an experienced man will be hired. In this case, probably only one day's orientation of the photographer will be needed. If an inexperienced man must be hired, then a week of training will probably be required.

Methods and Procedures.

1. Plot picking. In this phase of the project the locations will be chosen for both beetle-trend plots to be photographed and for the blowdown field plots to be ground sampled. Picking the locations of the blowdown plots from the air will prevent the possibility of field crews running out of saw-timber stands into burns, cutovers, etc. Choosing the beetle-trend plot locations from the air before the photography is done will enable the photo crew to photograph all plots in a minimum of time. This will avoid the complication of getting plots at widely varying stages of beetle development.

The plot picking will be divided into two parts: (a) establishing the pattern for the general locations of the plots; and (b) aerial scouting to choose the exact position.

- a. General pattern. One pattern for general locations will be established and this will serve for both types of plots. Furthermore, maximum use will be made of the beetle-trend plot locations chosen in 1952. Beginning with the pattern established in 1952, additional plot locations will be chosen by picking random townships on a small-scale map. A generalized type map will be used to insure that only those townships having a significant amount of saw-timber types will be chosen. To insure a reasonable distribution of plots, the Douglas-fir region will be divided into several sampling units and the numbers of plots chosen within each unit will be proportional to the estimated total saw-timber area in that unit.
- b. Aerial scouting. During this phase the general locations that were established on maps will be scouted from the air and the exact position of the plots will be selected and marked on the best available base maps. The scouting crew will be furnished with maps showing the townships which were picked for general locations. These will be marked as either blowdown plots only or both blowdown and beetle-trend plots. The scouting will be done as follows:
 - (1) Beetle-trend plots. The initial indicated township will first be scouted for a location meeting the requirements of a beetle-trend plot. If no location can be found within this township, then the adjacent townships will be scouted starting with the one to the north and working around in a clockwise direction.

The qualifications for a beetle-trend plot are: (a) a starting point easily identified from the air, such

as lookouts, road junctions, creek junctions, etc.

(b) A forested area consisting largely of saw timber extending in a cardinal direction from the starting point for a distance of at least two miles, and suitable for a plot $\frac{1}{4}$ mile wide and 2 miles long.

Having found such a location, the starting point will be marked on the map and the direction of the plot indicated. Also indicate whether or not there is significant beetle damage on the plot, as only those showing damage will be photographed this year.

Damage will be considered significant when there are groups of beetle-killed trees present. If the beetle-plot location also meets the requirements for a blowdown plot, as detailed in the next section, then the location will be marked for a blowdown plot as well as a beetle plot.

- (2) Blowdown field plots. The requirements for a blowdown field plot are: (a) an area of saw timber large enough to contain a field plot $\frac{1}{2}$ mile long; and (b) reasonable accessibility, preferably within $\frac{1}{2}$ mile of a road.

Where initial locations have been picked to qualify for both types of plots, the scouting crew will first pick an area which qualifies for a beetle-trend plot. If this location also meets the requirements for a blowdown plot, then it will be so indicated on the map. If the beetle-trend plot location does not qualify for a blowdown plot location, then the nearby area will be scouted for a location that does qualify. When such an area is located it will be marked on the map, showing plot starting point and direction plot is to be run.

Where the initial location has been picked for a blowdown plot only, the scouting crew will scout the initial township and then adjacent ones, if necessary, until a suitable location is found. In all cases, routes of accessibility not shown on the map will be sketched in.

2. Photography. Those beetle-trend plots which were marked by the scouting crew as having significant amount of beetle damage will be photographed with color film using standard aerial photographic techniques. The plot size will be $\frac{1}{4}$ mile wide and 2 miles long, but the photo run should extend for about 3 miles ($\frac{1}{2}$ mile before the starting point and $\frac{1}{2}$ mile beyond the ending point) in order to insure adequate stereo coverage of the plot. The

photo scale will be approximately 1:7500. Deviation from the mapped center line should be no more than $\frac{1}{4}$ mile. Reflights will be necessary where the first photos do not meet specifications.

3. Processing. All processing of photographic materials will be contracted. Rapid processing will be necessary in order that reflights can be made where required.

Results.

This project will result in the establishment of a system of permanent aerial photo plots by means of which future losses can be assessed annually without the necessity of extensive aerial surveys. Each year for the duration of the present epidemic these plots will be re-photographed. A comparison of the dead trees counted on successive annual photographs will provide an estimate of the total annual loss. Any shift in the intensity of the infestation or extension of its boundary will be detected by the regular annual regional survey conducted by the Bureau of Entomology and Plant Quarantine.

PROJECT NO. 4

GROUND SAMPLING OF 1952-53 BLOWDOWN TO DETERMINE VOLUME LOSS

The details of this project have yet to be worked out in cooperation with the State forestry departments of Washington and Oregon and with the Northwest Forest Pest Action Committee. However, the general plan will be about as follows:

Objective.

To determine the amount and character of any blowdown occurring since the 1952 survey which might affect the future of the beetle infestation.

Period of Survey.

Beginning approximately July 1 and extending for an indefinite period.

Area to be Surveyed.

To be decided. The area may consist of all of Washington and Oregon west of the Cascades, or only that portion of this area where Douglas-fir timber types predominate.

Personnel.

Field crews from the State forestry departments of Washington

and Oregon will do the work within the boundaries of their respective States. Some help from private landowners may also be incorporated in the plan through the Northwest Forest Pest Action Committee. Design of the sampling scheme and organization of the project will be done by the Experiment Station in cooperation with the States and representatives of industry.

Training.

Instructions for field crews will be simplified in such a way that field results will be comparable even though the work is done by a number of different crews. The training of a large number of crews from different organizations will be impossible.

Methods and Procedures.

1. General. A series of random or systematic plots will be visited by field crews and the volume of 1952-53 blowdown will be measured. These plots will provide an estimate of the total amount of blowdown which could affect the course of the beetle infestation.

The number of plots to be taken will be decided primarily by the amount of time and manpower available for the job, since there are insufficient data available to enable a calculation of the required number of plots for a given sampling error.

2. Location of plots. The exact locations of the field plots will be picked by aerial reconnaissance, because of the inability of field crews to observe from the ground an area of the proper type large enough to contain a field plot. These locations will be chosen along with the beetle-trend plot locations during the plot-picking phase of Project 3. Details of the procedure are described under that heading.
3. Field procedure. The details for the field procedure have not yet been worked out. Prior to the start of field work they will be worked out in cooperation with the two State departments of forestry and the Northwest Forest Pest Action Committee. Detailed field instructions will then be prepared and distributed.

Briefly the field procedure will be about as follows: The field crews will be furnished maps showing the exact positions of the plots which have been picked by aerial reconnaissance. The crews will locate these positions on the ground and lay out a field plot of considerable size, probably 2 chains wide and 40 chains long. On this plot they will take the necessary measurements to enable the calculation of the net volume of blowdown which has occurred since the summer of 1952.

Results.

The primary result of this project will be the calculation of the total amount of blowdown which has occurred from about July 1952 to July 1953. This will be an important factor in evaluating the trend of the present beetle infestation and future infestations.

A secondary result which may develop, depending on the eventual design of this project, is an estimation of one year's mortality in the entire area of western Washington and Oregon.

PROJECT NO. 5

PUBLICATION OF DETAILED MAPS SHOWING BARK BEETLE AND BLOWDOWN DAMAGE WHERE WARRANTED FOR SALVAGE PURPOSES

This project is tentative. Whether or not it is carried out depends on the results of Projects 1 and 2. If blowdown or beetle damage is found in sufficient quantities to be likely to cause reorientation of salvage programs, or the initiation of new salvage programs, then maps to aid these programs will be prepared under this project.

If any areas of blowdown, heavy enough to justify the publication of salvage maps, are discovered during Project 1, then those areas will have to be mapped with a plane and three observers on one-mile flight lines, following the procedures established during the 1952 survey. This will take the place of Project 2 in those areas. Such areas will be left until the last of Project 2, then they will be flown in additional detail to obtain the blowdown information. Maps showing both the blowdown and beetle damage will then be published at a scale of 1 inch to the mile and made available to the landowners.

If, during Project 2, any areas are discovered to have sufficient beetle damage to cause a shift in salvage plans, then maps showing this damage can be published without additional flying or field work.

COMPUTATIONS

Project 1.

None required.

Project 2.

One of the objectives of this project is to determine the total volume of beetle loss to date. Upon the completion of the project maps will be available showing the location of all beetle-killed groups of trees within the area of the infestation. These will be divided into two classes based on the estimated number of trees in the group. The average number of trees in each of the two classes

of groups can be determined by counting sample groups on the aerial photo plots taken during Project 3. The total number of dead trees in the mapped groups can thus be obtained. The average volumes per tree which were determined during the 1952 survey can then be applied to the total number of trees to get the total volume. The series of photo plots will provide a correction factor to take care of the beetle-killed groups which were missed during the mapping, and the scattered individual trees and groups too small to map.

Project 3.

No computations will be required for this project this year. However, as the plots are rephotographed each year, the additional dead trees will be counted to obtain an estimate of the additional annual loss. The method will be to determine the average ratio of trees which have died the last year to the total number already dead. This ratio, when applied to the total volume loss of prior years, will bring the total up to date.

Project 4.

While the details of this project are still somewhat tentative, the general computational procedure will be fairly simple. The blow-down field plots will probably be stratified into several units. The average per-acre blowdown volumes will be obtained from these plots within each stratum and then applied to the acreage of saw-timber types for that stratum. The acreage figures will be obtained from the latest Forest Survey figures, brought up to date where necessary by bookkeeping methods.

Project 5.

None required.

APPENDIX

Section I.—Operational Communications

The control of aircraft engaged in Project 2 will be under the direction of an Air Controller operating a Unicom radio set on 122.8 mc. This set will be a mobile station based on various lookout peaks located within the general work area. This will necessitate frequent shifting of the base station (called Air Control Station) as the mapping progresses.

The Air Controller will be responsible for the movement and maintenance of the Air Control Station so that continuous communications can be maintained with airborne project aircraft. His primary responsibility will entail frequent contact with aircraft and plotting their position on maps provided and initiating appropriate action when an aircraft fails to report its position.

Provision will be made for establishment of communication to the State or Forest Service Fire or Ranger Station in order to insure immediate action in case of an emergency. See chart on the following page.

The following procedure will be followed in the routine air-ground communications:

The pilot will:

1. Contact CAA to inform of take-off time and for radio check.
2. Contact Air Controller as soon as possible after leaving base or refuel airfield.
3. Contact A.C. (and CAA if possible) when aircraft arrives at "job." Notify A.C. of sequence of flight lines to be flown that day. Synchronize watches.
4. Report to A.C. when:
 - a. Starting flight line.
 - b. Entering a new quadrangle along the line of flight (or approximately every 18 miles).
 - c. Completing flight line.
 - d. Taking rest period.
 - e. Leaving job area.

5. On the line reports will include the following:
 - a. Plane identification.
 - b. Job number.
 - c. Flight line number.
 - d. Direction of flight.
 - e. Estimated air speed for line.
 - f. Special information (change in flight plan, contour flying, aircraft performance, etc.).
6. Notify A.C. of intentions for the next period of flying (either for the afternoon flight or the next day) when mapping period is completed.
7. When pilot cannot contact A.C. he will proceed as follows:
 - a. Head for Air Control Station and circle station twice then return to base field for radio repair.
 - b. Try to contact CAA if Air Control Station is too far away to reach in allotted grace period. Also continue to A.C.S. and circle twice.
 - c. Contact other plane (if airborne) to relay message to A.C.S.

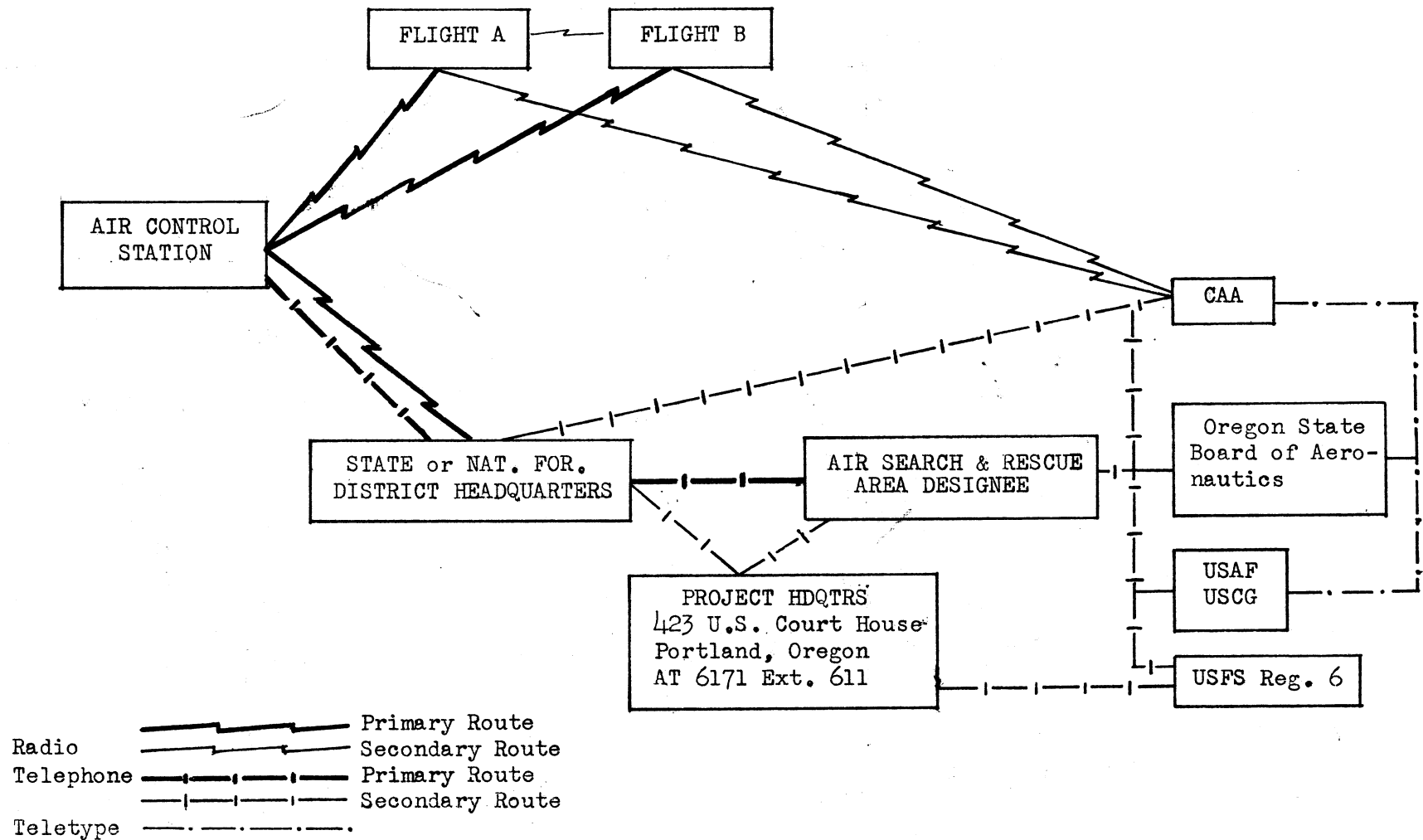
The Air Controller will:

- a. Acknowledge all contacts.
- b. Make periodic checks (1-hour intervals) of communication system with State or Forest Service Ranger Station when radio is sole means of communication.

The maximum time limit on all regular reports along flight lines will be 20 MINUTES. The Air Controller will allow a 20-minute grace period beyond this elapsed time before initiating contact with Air Search and Rescue as outlined below in Section II. During the 20-minute grace period the A.C. will contact the other aircraft to initiate preliminary search and also contact other lookouts in vicinity for observations.

It is visualized that contact in Cascades may be difficult. Pilots will climb to altitudes sufficient to make contact at each regular reporting time.

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Section II.--Emergency Rescue Procedure

The general plan of emergency rescue will be by agreement with the Oregon State Board of Aeronautics and their appointed Air Search and Rescue Designee and comparable agencies in the State of Washington.

The Air Search Rescue Designee in the area concerned has full authority to initiate and direct air search and rescue action. The Air Controller will notify the appropriate Designee FIRST when an aircraft is, in the A.C.'s opinion, missing.

The A.C. after determining that the aircraft is missing will initiate the Emergency Rescue Procedure by:

1. Notifying the appropriate Air Search Rescue Designee, informing him of the following:
 - a. Last reported position of aircraft.
 - b. Direction and speed of flight.
2. Contact project leader.

If missing aircraft is found to be airborne A.C. will notify Air Search Rescue Designee immediately and also project leader.

Important: All initiating action of air search and rescue will originate from the Air Search and Rescue Designee after initial contact by Air Controller. The A.C. will stand by to obtain further aid from the U. S. Forest Service if requested by the Air Search and Rescue Designee.

Section III.--Aircraft and Crew Safety

Policy and Objectives on Safety. On this operation the standard R-6 Forest Service policy is applicable: "No job is so important and no service is so urgent that we cannot take time to do our work safely." Each employee has a responsibility to prevent accidents. Our objective in applying safety measures will be to complete the job with no fatalities, no lost time and personal injuries, and no property damage accidents.

Action on Safety Measures. If any employee notes procedures where reasonable safety measures appear to be violated he should immediately call it to the attention of his supervisor who must then take corrective action as necessary.

Since there will be no regular supervisor on hand at the base field the primary responsibility for air and crew safety shall rest

with the Pilot. While he is operating in the air on mapping assignments he shall be under the immediate direction of the appointed senior observer insofar as technical mapping and observation operations are concerned but retains the authority as listed below:

1. The pilot shall comply with the direction's of authorized personnel only when in his judgment such compliance will not be a violation of Civil Air Regulations, Directives of the Administrator of the CAA, Forest Service Air Operations Handbook instructions, and U. S. Forest Service Safety Code, or will not endanger the aircraft, its occupants or cargo.
2. Pilots have the authority to cancel, terminate or change as necessary any flight when in their judgment such a flight is not safe. No Government officer can abrogate this authority.
3. The pilot may reduce the gross limitation of the aircraft (maximum not to exceed 2200 lb.) when he deems necessary to compensate for altitude, temperature and other adverse flying conditions that may develop. The pilot is responsible for checking the load of each flight to prevent overloading.

Flight Safety

The pilot shall in flight:

1. Maintain altitude 1000 feet above the ground or higher.
2. Maintain air speed at 65 mph or greater.
3. Level off at normal cruising speeds if cylinder head temperature gauge reaches danger point.
4. Take frequent rest periods from concentrated flying and mapping (usually at the completion of flight line).
5. Check fuel gauges frequently during flight.

The air crew will observe the following:

1. Don't smoke in aircraft.
2. Take frequent rest periods from concentrated mapping and flying (end of each flight line).
3. Wear or keep accessible your parachutes at all times. Wear chute harness at all times.

4. Fasten seat belts and shoulder harnesses for take-off and landing.
5. Observe all safety rules of CAA, U. S. Forest Service, Region 6 and of common sense.
6. Do not damage aircraft loading and unloading.

The pilot shall perform the following pre-flight check each morning before take-off.

1. Engine check.
2. Gas and oil--must be sure aircraft carries on take-off a minimum of 45 minutes reserve supply of gasoline above the amount required for the estimated round trip.
3. Check air frame and control surfaces.
4. Controls.
5. Clean windshields.
6. Make sure parachutes, first-aid kit and fire extinguisher aboard.

Pilot will file flight plan with CAA prior to take-off. No pilot will be permitted to fly more than 30 hours in six consecutive days or on more than six consecutive days. Because of adverse weather conditions during regular work week the project leader may authorize observational flights on week-ends when weather is suitable for such flights.

The pilot will familiarize himself with Forest Service Air Operations Handbook, especially pp. 1-1 to 1-15, 1-21 to 1-33, 1-37 to 1-42. Pilot should also be familiar with "Mountain Winds and their Effect on Flight," published by the Civil Aeronautics Board.

Aircraft Maintenance.

Since there will be no permanent base of operations and no specified project employee at the airfield the pilot will be responsible for supervision of maintenance on his airplane.

1. Pilot will arrange for 25-hour and 100-hour checks, as indicated by aircraft use, by a licensed A & E mechanic at the base field.

2. Pilot will make sure all "squawks" have been attended to before plane is used again.
3. Pilot will arrange at the base field for a daily aircraft inspection by a licensed A & E mechanic. A check list will be provided for the mechanic's use to insure complete coverage of daily inspection. A sample of the form follows.
4. The pilot will maintain a daily flight record on forms provided, upon which he will note any "squawks" on the operation and condition of the aircraft and call these to the attention of the A & E mechanic. He will also notify the Project Leader of any repair or service required which will interfere with the flying schedule. A copy of the daily flight record follows.

Date _____

CAA No. _____

Airplane _____

DAILY AIRCRAFT INSPECTION REPORTBlowdown-Bark Beetle Survey 1953

Daily line inspection is to be made on each airplane after each day of flying on this survey. Any discrepancies reported on the pilot's daily flight sheet, or found on the daily inspection will be noted, checked, and promptly corrected. All major discrepancies which would mean delays in remedying or entail grounding of the airplane will be brought to the attention of the AOO. Minor discrepancies will be checked and corrected as indicated on this inspection form.

Airplane Check Items	Okay Needs repair	Repair made-- see memo
1. <u>Engine and Nacelle Group</u> a. Propeller. Check for cracks, nicks or damage. b. Electrical. - Voltage regulator. - Generator for oil leaks & housing secured to frame. - Starter - housing secured to mounting frame. c. Engine Controls. - Throttle control. - Carburetor heat control. d. Power Plant. - Cowling for damage & security. - Carburetor heat - clear & unobstructed. - Oil filter mounting bracket secure. 2. <u>Wing Group</u> (wings, vertical & horiz. stabilizer) a. All surfaces for tears, abrasions, defects. b. All moveable surfaces (aileron, flaps) for damage and obvious defects. 3. <u>Fuselage Group</u> a. General condition; windows & windshield clear. 4. <u>Flight Control Mechanism</u> a. Function & normal operation of rudder, flaps, elevator & aileron from cockpit. b. Inspect bearings & hinges of above for looseness or cracks. 5. <u>Tail Gear</u> - proper functioning. 6. <u>Landing Gear, Wheels & Brakes</u> a. Fairings & struts for gen. cond. & defects b. Tires-proper inflation & cond. (20-21# pressure) c. Wheel covers tight. d. Brake and parking brake. e. Hydraulic lines for leaks. 7. <u>Fuel System</u> a. Drain fuel strainer b. Oil level full c. Fuel level full d. Lines from outside for oil or gas leaks		
Remarks: _____		

. A&E

Signature

DAILY AIRCRAFT FLIGHT REPORT
Blowdown-Beetle Survey
1953

Date _____ 19____
Pilot _____

CAA No. _____ Report No. _____
Airplane _____

DESCRIPTION OF FLIGHT MISSION

No.	FROM	TO	Flight Time			Character of Flight	
			Takeoff	Landing	Total	Code*	Forest
1							
2							
3							
4							

COST OF OPERATIONS

No.	GASOLINE		OIL		REPAIR COSTS		STORAGE CHARGE	Visibility and Weather
	Gals.	Price	Qts.	Price	Parts	Labor		
1								
2								
3								
4								

Remarks:

Passengers: _____

Discrepancies on airplane: _____

Miscellaneous: _____

* SM = Sketch mapping, F = Ferry, P = Photography, R = Radio check, T = Test hop
TR = Training.

Certified correct by: _____
Air Operations Officer